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considerable distance inland on the sea-breezes and return with the opposite upper current to the coast within a few hours. For long balloon voyages, either trans-continental or trans-Atlantic, the charts are invaluable, showing, as they do, the level which the balloon should seek in order to obtain the benefit of the most favorable winds in respect to both direction and velocity, while other tables indicate the effects upon the passengers and upon the gas and motors.

The author does not mean to intimate that it is his belief that such balloon voyages will ever be of utilitarian value, but it does seem to him probable that the voyages would bring valuable data to the science of meteorology.

The reviewer would bespeak for Rotch and Palmer's method the most careful consideration of those engaged in this research work. There is a danger ahead. It is that in the strong and justifiable desire to be original the workers may follow diverse methods, making comparison and coordination of results extremely difficult, if not impossible, and thus labor may be wasted.

This is the day of "team-work," and only by such work can the aerial ocean be charted.

JAMES MEANS

*Principles of Physics.* By W. F. MAGIE, of Princeton University. New York, The Century Co. 1911.

Within the past four months as many new college text-books in physics have appeared as in the preceding four years. New books by Carhart, whose earlier texts have had such wide success, by Magie of Princeton, Kimball of Amherst, Reed and Guthe of Michigan, and Hurst and Lattey of Oxford, Eng., added to the several good books already available, give college instructors a much wider range of choice for a suitable text for class use than they have had for many years.

Perhaps the most unique and original of the new offerings is that by Professor Magie, of Princeton University. Doubtless many teachers have felt that our common texts make too scant use of the historical development of physics in their presentation of its

principles. The connection of related topics is often best brought out by showing how the emphasis of one in the scientific thought of a certain period, has led to discoveries in the other field. After reading such a book as Mach's "Mechanics" I have often longed for a text in general physics enriched with more of the historic evolution and the philosophy of the subject. But perhaps few of us would go as far as the author of this book does when he takes as a general principle "the progress of discovery has been along the line of least intellectual resistance and it is probable that what was easiest to discover once will now be the easiest to understand." This seems to assume that the attitude of mind of the pioneer in discovery is much like that of the student seeking to grasp the principles of a new science. But the one has the knowledge of what has been done in his branch of science to suggest further advance; the other must get his grasp on the new truth rather by relating it somehow to the facts of his own limited experience, else it will all seem unreal and bookish to him. The sophomore is not a scholar; he is little more than a boy and it is doubtful if the line of historic development will in every case give the best view-point for him. For a mature student or one who is seeking by a review of the subject to strengthen the foundations after a too hasty course in physics this book will be most suggestive, even inspiring. Professor Magie's method of treatment brings one into close relationship with the master minds who have given direction to the larger movements in scientific thought and such relationship is inevitably stimulating.

This historical point of view determines perhaps the unusually large proportion of the book devoted to mechanics and the properties of matter. This amounts to about 39 per cent. of the book. (The proportion found in four other recent texts by American authors averages 24 per cent.)

The use of the historical method doubtless explains also the relatively small attention given to the illustration of physical principles from modern machinery and industrial processes. To devote but a half page (p. 486) to

dynamo-electric machines and only a short paragraph (p. 495) to storage cells is very unusual in this day of devotion to the practical. The transformer seems scarcely to be mentioned.

An unusual feature of the book is the use of so-called "examples" to introduce important theorems and propositions to be proved. These are presented in groups at frequent intervals and are entirely different in character from the numerical examples usually given in college texts. Numerical examples of the ordinary sort are not wanting, but about 250 of them are given together at the end of the book as "exercises." (It would seem better to call the "exercises" examples and the "examples" exercises.)

The author justifies the use of a statical measure of force, the late introduction of the relation of heat to energy and the use of the method of rays in optics, on the ground that these are in harmony with his plan of following the historical order of development.

To sound and wave-motion even less than the usual proportion of space is given, only 6 per cent. of the book being allowed it.

The treatment of heat is decidedly satisfactory, the use of the historical method being particularly well adapted to this field. This is noticeable in the discussions of thermometry and of Carnot's cycle and the second law of thermodynamics. The absence of tables in the body of the text, characteristic of the whole book, seems a marked defect in this portion. There is scarcely any reference made to the small group of tables given collectively at the end of the book.

The discussion of light is marked by a complete separation of geometrical and physical optics, each receiving practically equal attention. The discussion of velocity of light is unusually brief and that of diffraction more extended than is common in college texts.

To electricity and magnetism rather less than the usual amount of space is given (24 per cent. as compared with 32 per cent., the mean of four recent texts). Magnetism and electrostatics are treated with relative fullness, but current electricity, and particularly electro-

magnetic induction, are too briefly discussed.

The many teachers who desire to see increased emphasis placed upon the historical development of physical thought, will follow the career of this book with special interest and hope that it may have a wide introduction.

A. D. COLE

*A Text-book of Physics.* By H. E. HURST and R. T. LATTEY. New York, Van Nostrand. 1910. \$3.00 net.

This new text in physics comes from two Oxford University men. It is designed especially to fit students for the preliminary examination in Oxford Natural Science School. In carrying out this purpose a large number of examples are given, taken from actual examinations recently set at the universities of Cambridge, Oxford and London.

The book seems to be a combination of class text and laboratory manual. Too little attention is given to mechanics and the properties of matter are practically left out altogether. Universal gravitation and harmonic motion are other omitted topics. In the discussion of heat no treatment of the second law of thermodynamics, Carnot's cycle or the efficiency of heat engines appears. Light is presented in a very elementary way and wholly from the standpoint of geometrical optics. Interference, diffraction and polarization are not discussed at all and the treatment of spectroscopy is wholly from an elementary laboratory standpoint.

An undue amount of space—248 of the 610 pages of the book—is given to electricity and magnetism. (In contrast with this less than 100 pages are given to mechanics.) Here again some curious omissions may be noted. It seems particularly strange in an English text to find no discussion of Crookes's tubes, cathode rays, radioactivity or electrons.

The index is very incomplete and unsatisfactory. The illustrations, print, paper and general physical appearance of the book are good. The treatment of many important topics is so elementary and incomplete, and so many others are omitted altogether, that the